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ABSTRACT

Children instruct primarily through demonstration and models, while their teachers show a greater reliance on verbal instruction. However, several authors have noted differences between the instructional styles used in classrooms and those used in nonacademic instruction. Nine-year-old teachers use more nonverbal than verbal instruction, and refer more frequently to specific instances or items, than to general concepts. Adult teachers use more verbal than nonverbal instruction, and provide more concept or category information than information specific to instances. Learners taught by adult teachers perform better on tests of memory and generalization than do those taught by child teachers. Task differences in instructional strategies are also evident. Both child and adult teachers provide more verbal information, particularly category information, in the school than in the home task. More nonverbal information is also provided in the school than in the home task. Adults and children utilize different instructional strategies which vary in effectiveness. The choice of instructional strategies is influenced by the context in which the instruction occurs. (Author/JD)

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ADULTS AND CHILDREN AS TEACHERS

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ABSTRACT

Observations of teaching episodes in classrooms suggest that children instruct primarily through demonstration and modeling of tasks, while their teachers show a greater reliance on verbal instruction. However, several authors have noted differences between the instructional styles used in classrooms and those used in nonacademic instruction. The present investigation compares the instructional strategies used by children and adults on two laboratory classification tasks resembling home and school activities. Nine-year-old teachers were found to use more nonverbal than verbal instruction, and referred more frequently to specific instances or items, than to general concepts. Adult teachers used more verbal than nonverbal instruction, and provided more concept or category information than information specific to instances. Learners taught by adult teachers performed better on tests of memory and generalization than did those taught by child teachers. Task differences in instructional strategies were also evident. Both child and adult teachers provided more verbal information, particularly category information, in the school than in the home task. More nonverbal information was also provided in the school than in the home task. The findings suggest that adults and children utilize different instructional strategies which vary in effectiveness, and that the instructional strategies observed are influenced by the context in which the instruction occurs.

INTRODUCTION

The social interactions of children are very likely to include episodes in which some children serve as teachers or instructors of others. Ethnographic studies of children's social activities have shown that children in a number of cultures spend a great portion of their time with other children who are several years younger or older than themselves, as well as with children who are nearer to their own age (Ellis, Cromer, & Rogoff, Note 1; Jordan, Note 2; Konner, 1972; Rogoff, Note 3). Frequently, children's interactions with other children involve the care of younger children (Jordan, Note 2; Weisner & Gallimore, 1977) and instruction in tasks such as games or social rules which adults, because of lack of interest or knowledge, are unable to teach to children (Cicirelli, 1976b). Researchers and educators interested in making classroom practices more compatible with the larger social world children experience have extended the idea of peer teaching to academic settings and tasks (Jordan, Note 2; Rosenbaum, 1973).

Peer tutoring programs have often been implemented with the goal of improving the social, as well as the cognitive, skills of tutors and their students (Allen, 1976; Devin-Sheehan, Feldman, & Allen, 1976; Gartner, Kohler, & Riessman, 1971). Studies have compared adult and child teachers, and child teachers differing in age, sex, and kinship status on such social dimensions of teaching as supportiveness and acceptance (Cicirelli, 1976a; 1976b; Ludeke, Note 4; Steward & Steward, 1974). Some ethnographic analyses of peer teaching episodes in

classroom settings have focused on the linguistic strategies children use in managing the roles of teacher and learner (Carrasco, Vera, & Cazden, in press; Cazden, Cox, Dickinson, Steinberg, & Stone, 1979).

The actual process of instruction or information transmittal which characterize peer teaching have not, however, been systematically examined. Observations of teaching episodes in classroom settings suggest that children instruct primarily through demonstration and modeling of tasks, while their teachers show a greater reliance on verbal instruction (Jordan, Note 5; Mehan, 1977). Jordan, in observations of kindergarten and first grade classrooms, found that modeling and physical intervention were two of the more common instructional strategies used by Hawaiian children. Jordan noted that teaching interactions between children tended to be oriented towards task completion, rather than the transmission of general rules. Adult teachers, in contrast, transmitted information primarily through out-of-context rule-statements and long sequences of verbal directions. Comparable differences between adult and child teaching styles were noted by Mehan in observations of a multi-grade, ethnically mixed classroom.

Despite the lack of research focusing on processes of peer instruction, many authors have assumed that children can be effective teachers. In fact, some authors have argued that because peers share the same language level and perspective, they may sometimes be better teachers than adults (Allen, 1976; Cicirelli, 1976b; Piaget, 1959; Steward & Steward, 1974).

Jordan (Note 5) and Mehan (1977) suggested that while the instructions of children and adults may be organized differently and transmitted through different communicative modes, the messages received by

the learners may be functionally equivalent. Mehan has argued against an overemphasis on verbal means of instruction, and suggested that children can serve as competent teachers if activity-based learning is allowed. The view that children can communicate effectively with the aid of nonverbal modes is also reflected in Piaget's (1959) distinction between "acted" and "verbal" cases in children's conversations. Piaget wrote that children as young as five or six years of age are capable of understanding each other well when involved in acted conversation, that is, conversation aided by the presence of task materials, gestures, and demonstration.

Research on maternal teaching style has suggested that verbal instruction may be more highly related to some kinds of cognitive learning than is nonverbal instruction. The amount of verbal instruction used by mothers on a variety of tasks has been shown to be positively correlated with the child's performance on some cognitive tests measuring verbal ability, while the amount of nonverbal instruction has been either unrelated to test performance or predicts poor performance on verbal tests (Jordan, Note 5; Rogoff, Note 6). However, Kirk and her colleagues have found that specificity of maternal instruction, in either verbal or nonverbal modes, is positively related to the child's performance on cognitive tests of spatial ability (Kirk & Burton, 1977). It should be noted that these studies have not tested the relationship between teaching style and the child's performance on the material taught, but used cognitive measures not involved in the teaching tasks.

The present study compared the instructional strategies used by children and adults on two laboratory classification tasks. We predicted that the differences in strategies used by children and adults

would be similar to the differences suggested by Jordan and Mehan. Child teachers were expected to use more nonverbal instruction than were adults, who were expected to use predominantly verbal instruction. We also hypothesized that child teachers would instruct through references to specific instances, while adults would transmit conceptual information through rule statements. Effectiveness of instruction by adult and child teachers was also assessed.

Instructional strategies are likely to be influenced by the tasks used and the context in which the teaching interaction occurs. A number of authors have been concerned, in particular, with the distinction between "informal" (out of school) and "formal" (academic) instruction (Bruner, 1966; Scribner & Cole, 1973; Vygotsky, 1962). Scribner and Cole and Bruner have suggested that informal or out of school instruction occurs largely through observation and participation in activities, while formal or school instruction transmits information primarily through verbal directions which are often out of context. Vygotsky similarly distinguished "spontaneous" and "scientific" (acquired in school) concepts. Spontaneous concepts are acquired through rule induction after repeated experience with relevant examples, while scientific concepts are learned first as verbal definitions and are linked, from the start, to other concepts. Mehan has commented that both instruction by children and informal instruction are characterized by demonstration and modeling, rather than by the verbal formulation of rules.

This study examined teaching strategies on two tasks resembling home (informal instruction) and school (formal instruction) activities. A comparison of peer and adult teaching strategies used in actual

everyday and school tasks would be optimal; however, several authors have noted the difficulty of capturing instances of "real-world," non-academic instruction (Bruner, 1966; Rogoff, Note 6). A laboratory investigation of formal and informal instructional strategies allows the researcher to structure similar problems across tasks, as well as providing an opportunity to sample strategies on more than one task. Teachers in the school task were expected to use primarily verbal instruction, while teachers in the home task were expected to make greater use of nonverbal means of instruction. The use of rule statements was predicted to be greater in the school than in the home task.

METHOD

Subjects

Thirty-two dyads composed of adult-child and child-child pairs participated in videotaped teaching interactions. The subjects were recruited from an elementary school serving an upper middle-income population of Salt Lake City. "Teachers" were nine-year-old children ($\bar{X}$ = 9.0; range = 8.0 - 9.8) and adult females who were mothers of children of the same age as the learners. "Learners" were seven-year-old children ($\bar{X}$ = 6.9; range = 5.9 - 7.8) not related to the teacher. Sixteen of the teachers were adults and sixteen were children. The teachers and learners in the child-child pairs were of the same sex, and differed in age by an average of 2.2 years. Equal numbers of male and female children participated in the study.

The 2 x 2 x 2 factorial design included factors of age of teacher, task, and sex of learner. Teacher-learner pairs were constructed with an aim of keeping age of learner and age differential between child teachers and learners as balanced as possible across conditions.

Tasks and Materials

Each dyad participated in one of two tasks resembling home and school activities. The home task involved putting grocery items on shelves in a mock kitchen; the school task involved sorting photographs of common objects into a tray divided into compartments. In both tasks the teacher taught the location of eighteen items which were grouped

into six categories. After a delay, the learner sorted eight of the original items and twelve new items.

Home task

The room was decorated to look like an actual kitchen. The room contained a table and several chairs, a refrigerator, a stove and three cupboards of varying size and color. Colorful curtains partially covered the one-way vision mirrors, a calendar, posters, and pot holders were hung on the walls; the cupboards and drawers contained pots, pans, dishes, and silverware. Recipes and children's art work decorated the refrigerator door.

Eighteen grocery items were grouped into six categories and located on different cupboard shelves. The categories and items used in the teaching interaction were condiments (ketchup, pickles, olives); snacks (Doritos, crackers, cookies); sandwich spreads (margarine, honey, peanut butter); fruits (pineapples, peaches, applesauce); baking goods (cake mix, muffin mix, flour); and dry goods (macaroni mix, rice, taco shells). During the test phase, learners replaced one or two items from each of these groups, along with the following generalization items: condiments (mustard, pickle relish); snacks (Saltines, graham crackers); sandwich spreads (jam, mayonnaise); fruits (apricots, mandarine oranges); baking goods (brown sugar, Bisquick); dry goods (noodles, spaghetti). The items used were actual groceries; pretesting ensured that young children could identify the items used.

School task

Color photographs (8½ x 6½ cm) of eighteen common items were spread in a tray divided into six brightly colored compartments. The

tray was placed on a table located at one side of the "kitchen." The categories and photographs used in the teaching interaction were machines (popcorn popper, hair dryer, typewriter); cutting tools (scissors, paring knife, lawn mower); table settings (table knife, bowl, cup); hygiene articles (toothbrush, razor, curlers); baking utensils (wooden spoons, mixer, measuring cup); and cleaning tools (broom, bucket, rubber gloves). During the test phase, the learners replaced one or two items from each of the groups, in addition to the following generalization items: machines (toaster, sewing machine); cutting tools (saw, sewing shears); table settings (spoon, glass); hygiene articles (comb, brush); baking utensils (cupcake pan, measuring spoons); cleaning tools (sponge, mop). The photographs were pretested with young children to ensure familiarity with the items.

Procedure

Teaching phase

A female experimenter escorted the teacher into the "kitchen" and showed the items (either groceries or photographs) placed in the correct locations. The experimenter asked the teacher to view the items until s/he knew the organization. The experimenter asked child teachers if they were familiar with all of the items; if not, she told them what the items were. The category structure of the items was not pointed out to the teacher.

In the home task, the experimenter told the teacher to pretend that s/he and the learner had just returned from the grocery store and needed to put the groceries where they belonged on the shelves. In the school task, the experimenter told the teacher to pretend that s/he

and the learner were at home working on some homework problems. The experimenter encouraged the teacher to teach the way s/he teaches when at home putting groceries away (home task) or working on homework (school task).

A cue sheet illustrating the items and locations was provided for the teacher. The experimenter told the teacher to use the cue sheet when necessary, but asked the teacher to look at the organization once more so as to decrease the need for the cue sheet. The experimenter told the teacher to use whatever method they liked, except showing the cue sheet, to help the child learn the locations of the items. The teacher was informed that the learner would be asked to replace some of the items and sort some new items after a delay. The teacher then left the room and the experimenter removed the items from the locations and placed them in a predetermined order, the groceries in two brown sacks and the photographs in a single stack.

Both the teacher and learner then came to the kitchen and the instructions were repeated. The experimenter informed both that it was important for the learner to know the organization of the items because after a short delay the learner would return to the kitchen to place some of the old items and some new items in the proper locations. Videotaping began with the experimenter's departure and continued through the teaching interaction. After the instruction was completed, the teacher and learner joined other children and adults in a waiting room where magazines and toys were available. Five minutes later, the learner returned to the kitchen alone to place the twenty test items. The learner could take as long as s/he wished to complete the task. The total procedure took 20 - 30 minutes per dyad.

Test phase

The test phase involved the learner placing twenty items: eight of the items used previously in the teaching interaction, and twelve new items introduced to test generalization. The items were presented in a predetermined order, the groceries in two sacks and the photographs in a single stack. Each child attained a score for the number of original and for the number of new items placed in the correct locations.

Coding System

Two graduate students who were not informed of the hypotheses of the study coded the videotaped teaching interactions according to a system designed to measure the frequency of selected verbal and nonverbal dimensions of instruction. Both teacher and learner behavior were coded.

Verbal information

The observers coded information provided verbally as either item name, category information, or information about the physical locations, task requirements, or mnemonics. The sum of these categories yielded a total verbal information score. About 75% of the information provided verbally was either item or category information. Since the pattern of the other types of verbal information did not vary across conditions, only item and category information were analyzed in detail.

Item and category information were coded out of an interest in comparing the frequency of references to specific instances vs. references to general rules. The observers coded item name each time a

single target item was labeled (e.g., This is a cup we drink out of; Put the Doritos by the snack things). Category information included instances in which a category name was provided (e.g., Does that go with the relishes or the fruits?); categories were defined by function or some other characteristic (e.g., We use these in the morning; All of the foods on this shelf could go on hotdogs or hamburgers); and individual items were discussed in relation to other items (e.g., That goes with the ketchum and olives). Verbal information could be conveyed in units as small as one or two words, thus several information units could be contained in one sentence or clause.

Nonverbal information

Gestures and placement of items also conveyed information about the task and items. A total nonverbal information score was based on the sum of gestures and placement. Since the gestures category followed the same pattern as that found for the total nonverbal score, it will only be considered here as a component of that score. Gestures were discrete body movements which conveyed information about the items or locations (e.g., pointing, nodding, holding up an item). The observers coded placement each time a task item was put on a shelf (home task) or in a compartment (school task).

Reliability

The dyads examined in this study were part of a larger project comparing the teaching strategies of mothers, unrelated adults, and children. The entire project involved 64 teacher-learner pairs, including the 32 reported here. Each of the two observers coded 40 tapes; sixteen (25%) tapes were coded independently by both observers

for reliability purposes. Reliability was calculated by computing a product moment correlation for the sixteen pairs of scores provided for each category. Reliability estimates computed from a sample of eight tapes used in this study showed the same pattern as that found for the total 16 tapes. We selected to report correlation coefficients for 16 tapes, however, because some of the categories occurred infrequently in the teaching interactions of the child-child pairs, thereby making reliability difficult to assess with only eight tapes. Reliability scores were as follows: Time ($r = .98$); Teacher: total verbal information (.96), item name (.96), category (.94), total nonverbal information (.76), placement (.91); Learner: total verbal information (.92), item name (.87), category (.91), total nonverbal information (.96), placement (.98).

Intercorrelation of coded variables

Intercorrelation coefficients for the coded variables were computed by calculating coefficients for the variables in each condition, standardizing the scores, and determining means. The means, transformed back into correlation coefficients (r), are reported in Table 1.

Table 1.

Intercorrelation Coefficients for Coded Variables

	Teacher Placement	Teacher Nonverbal Information	Teacher Item Name	Teacher Category Information	Teacher Total Verbal Information	Learner Placement	Learner Nonverbal Information	Learner Total Verbal Information	Time
Teacher Placement		.59	-.02	-.08	-.22	-.52	-.37	.27	.19
Teacher Nonverbal Information			.35	.61	.61	.11	.32	.68	.77
Teacher Item Name				.53	.79	.20	.42	.66	.56
Teacher Category Information					.91	.48	.66	.71	.67
Teacher Total Verbal Information						.43	.63	.73	.84
Learner Placement							.78	.21	.47
Learner Nonverbal Information								.50	.49
Learner Total Verbal Information									.58
Time									

RESULTS

A teacher x task x sex of learner analysis of variance was conducted on frequency scores. The ANOVA revealed sex differences on several dimensions: teachers spent more time involved in the teaching interactions with male than female learners; provided more information, both verbally and nonverbally, to male than to female learners; and conveyed more information about the requirements of the task and categories to male than to female learners, F (1, 24) = 9.29, $p < .01$; = 5.68, $p < .05$; = 5.97, $p < .05$; = 4.30, $p < .05$; = 4.27, $p < .05$. The findings of the larger study did not, however, support these sex differences. The sex differences found are likely to be a function of the small number of subjects of each sex in each condition. While the amount of information provided to male and female learners differed, the kinds of information provided showed the same pattern for male and female learners. Therefore, the data for male and female learners were combined for subsequent analyses.

Memory and Generalization Test

Learners who had been taught by adult teachers performed better on the test for memory and generalization than did learners taught by child teachers. As indicated in Table 2, learners taught by adult teachers correctly placed more of both the original items and generalization items than did learners taught by child teachers, F (1, 28) = 7.76, $p < .01$; = 8.23, $p < .01$. Memory for old items did not vary

Table 2.

Percentage of Items Correctly Placed on Memory and Generalization Test

Teacher & Task	Old Items	New Items	Total	Range
Adult (across tasks)	75%	63%	68%	25 - 95%
School Task	81%	70%	74%	45 - 95%
Home Task	69%	56%	61%	25 - 80%
Child (across tasks)	52%	40%	45%	15 - 80%
School Task	49%	49%	49%	25 - 80%
Home Task	56%	31%	41%	15 - 75%

significantly between tasks. Task differences in generalization to new items did approach significance, with generalization being greater in the school than in the home task, F (1, 28) = 3.83, $p < .06$.

Instructional Strategies

Verbal information

Adult and child teachers differed in both the amount and most frequent type of verbal information provided. Adult teachers provided more verbal information than did child teachers, F (1, 28) = 23.33, $p < .001$. Adult teachers provided an average of 63 units of information verbally; child teachers provided an average of 19 units of verbal information.

Adult teachers provided a greater amount of both item and category information than did child teachers, F (1, 28) = 4.83, $p < .05$; = 27.93, $p < .001$. As shown in Figure 1, however, adults provided significantly more category than item information, t (15) = -4.11, $p < .01$, while child teachers provided slightly more item than category information, t (15) = 1.55, $p < .10$. Of the total verbal information transmitted by adult teachers, 23% involved item names and 54% category information. Forty-two percent of the verbal information provided by child teachers consisted of item names; 33% of the verbal information consisted of category information.

Relationship between verbal and nonverbal information

Adult and child teachers did not differ significantly in the amount of information each conveyed nonverbally, F (1, 28) = 1.20, $p < .30$. Adult and child teachers did differ, however, in the

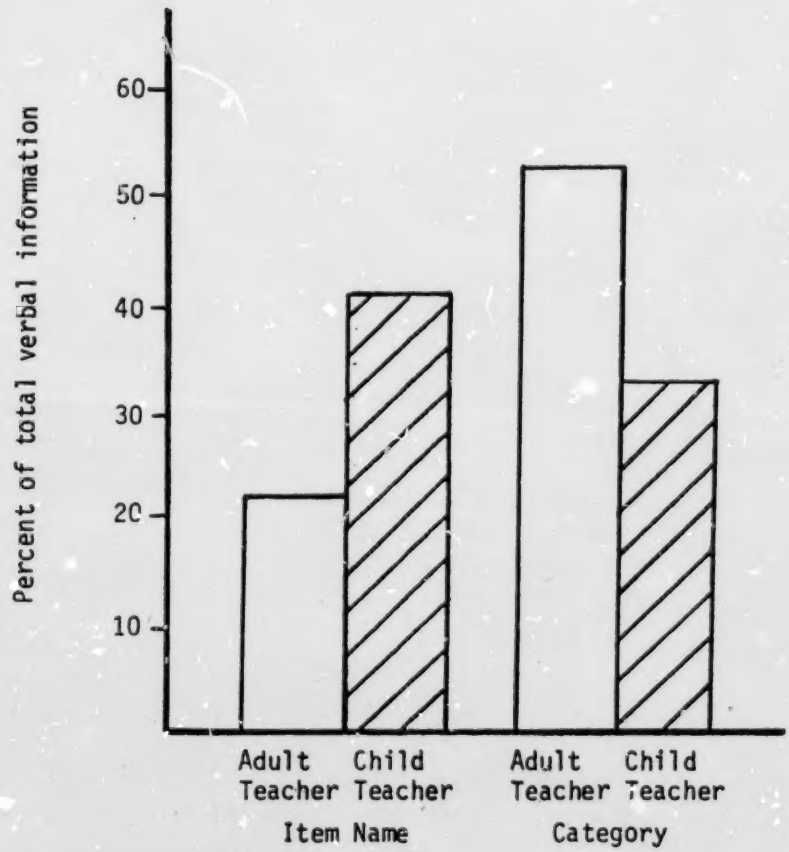

Figure 1. Proportion of item vs. category information provided by adult and child teachers.

relationship between the amount of verbal and nonverbal information provided. As indicated in Figure 2, child teachers provided more nonverbal information than verbal information, while adult teachers provided more verbal than nonverbal information, t (15) = 2.42, $p < .05$; = -2.72, $p < .01$. Sixty-six percent of the total amount of information provided by child teachers was nonverbal, 43% of the information provided by adult teachers was nonverbal.

Learner participation

As shown in Figure 3, learners contributed more verbal information to the teaching interaction when with adult as compared to child teachers, F (1, 28) = 8.07, $p < .01$. About 90% of the verbal information contributed by learners consisted of item or category information. Learners with both adult and child teachers provided about the same amount of item as category information, t (15) = -.27, $p < .20$; = -.25, $p < .20$.

The amount of nonverbal information contributed by learners did not differ significantly by type of teacher. Similarly, the number of items placed by learners did not differ significantly between adult and child teachers. As indicated in Figure 4, however, the relative number of placements by teacher vs. learner varied according to whether the teacher was an adult or child, F (1, 28) = 4.60, $p < .05$. Learners placed 69% of the items when with adult teachers, and 44% of the items when with child teachers.

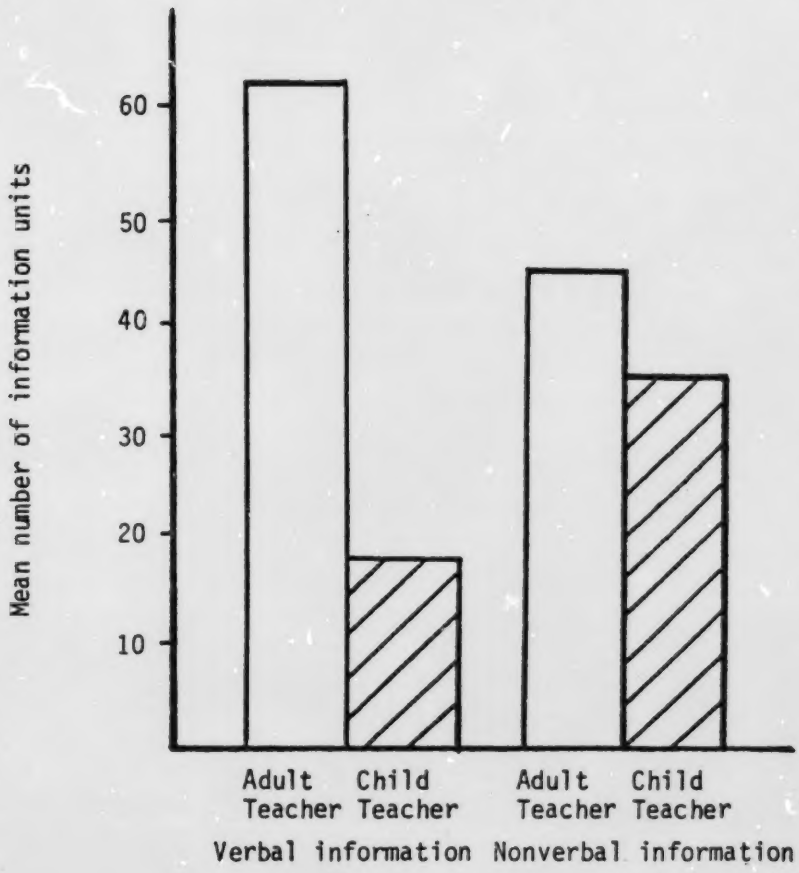

Figure 2. Amount of verbal and nonverbal information provided by adult and child teachers.

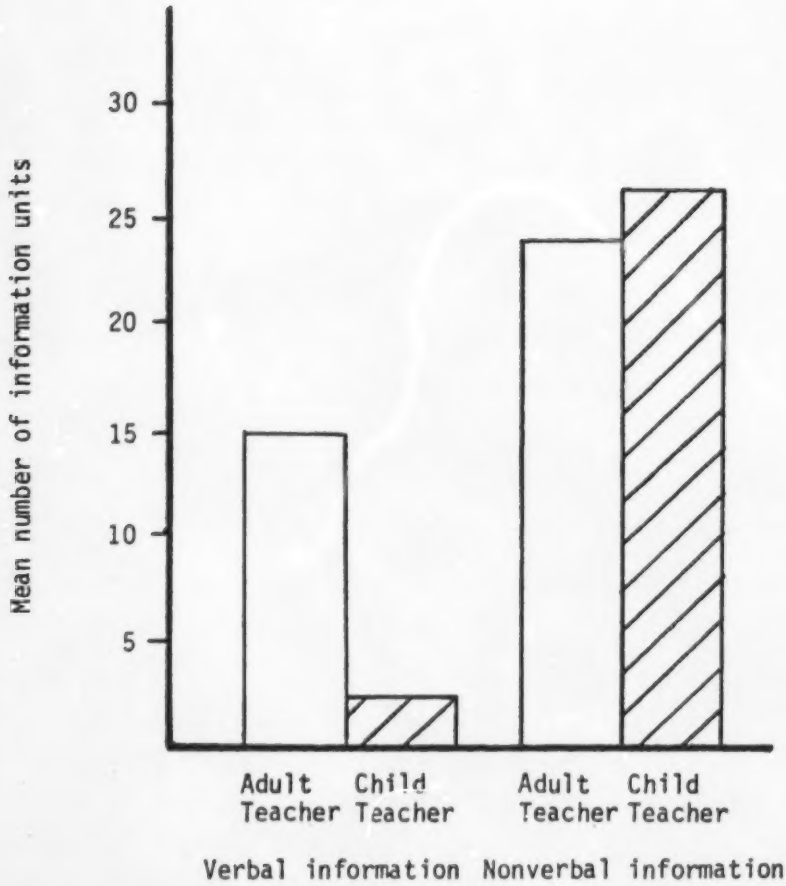

Figure 3. Amount of verbal and nonvergal information contributed by learners when with adult or child teachers.

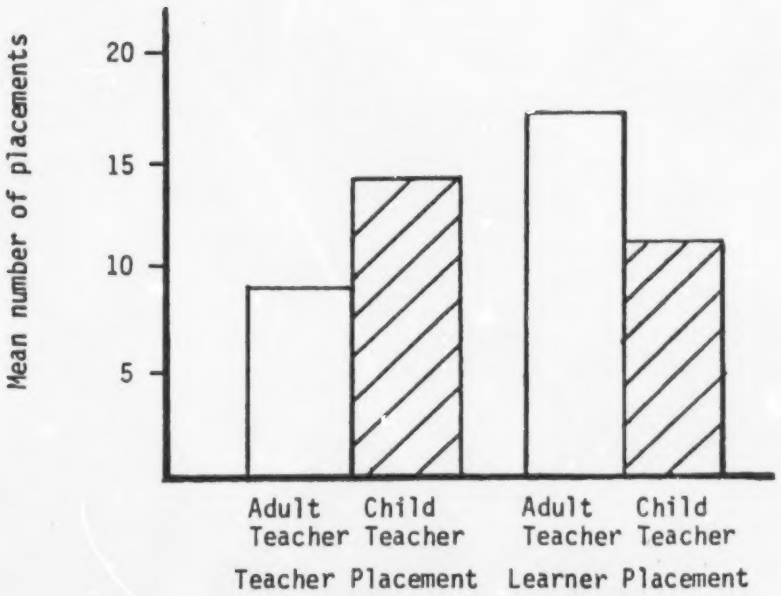

Figure 4. Distribution of teacher and learner placements according to age of teacher.

Instructional Strategies as Influenced by Task[1]

Information provided by teacher

Differences in instructional strategies were also evident across tasks. The teaching interaction in the school task was, on the average, twice as long as the teaching interaction in the home task. The longer duration of the school task, F (1, 28) = 7.20, $p < .05$, was consistent with the greater amount of nonverbal information provided in the school than in the home task, F (1, 28) = 4.27, $p < .05$. There was not a significant difference between tasks in the amount of verbal information provided, F (1, 28) = 1.39, $p < .25$.

As shown in Figure 5, the distribution of item and category information differed across the home and school tasks. Although the amount of item information provided by teachers did not vary across tasks, a significantly greater amount of category information was provided in the school than in the home task, F (1, 28) = 4.71, $p < .05$. Furthermore, although teachers provided about the same amount of item and category information in the home task, t (15) = -.43, $p < .20$, they provided a greater amount of category than item information in the school task, t (15) = -3.42, $p < .025$. Across teachers, 37% of the total verbal information provided in the home task consisted of item

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[1] F_{max} tests for homogeneity of variance have indicated that many of the following task comparisons are marked by significant heterogeneity of variance. The F distribution has been shown to be robust with respect to violations of the assumption of homogeneity when there are an equal number of subjects in the various conditions (Kirk, 1968). Although we do have an equal number of observations in each condition and have proceeded to perform the ANOVAs, we recommend that these findings be regarded as tentative.

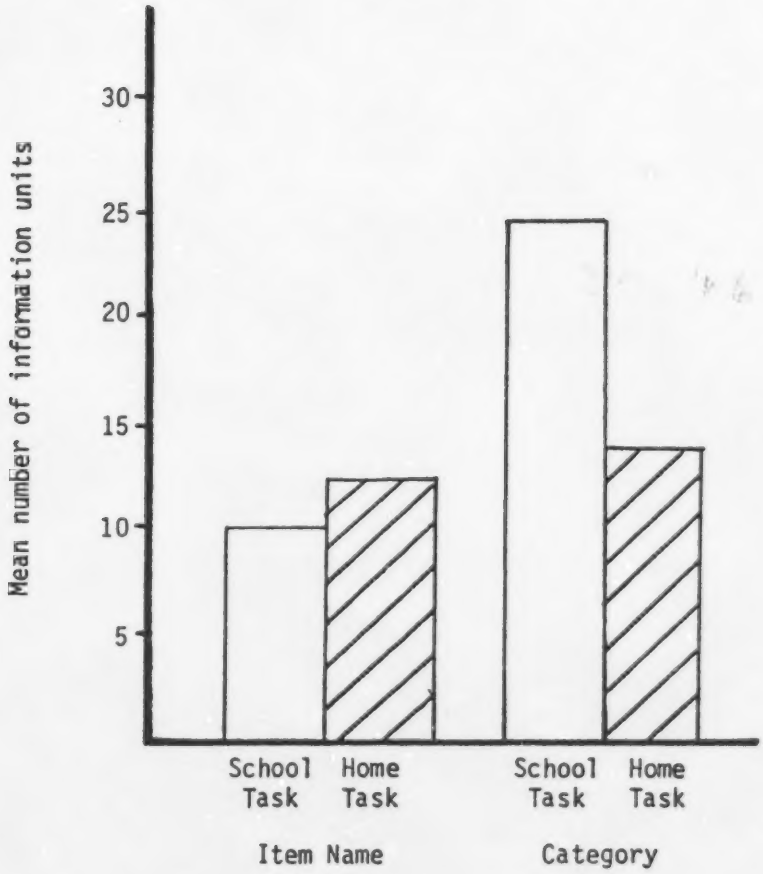

Figure 5. Amount of item and category information provided by teachers in home and school tasks.

names, while 41% consisted of category information. In the school task, 21% of the verbal information provided by teachers consisted of item names, while 56% consisted of category information. Teacher x task interactions for item and category information were not significant, F (1, 28) = .04, $p < .85$; = 1.58, $p < .20$.

Learner participation

Significant task x teacher interactions were found for the amount of verbal information and amount of nonverbal information contributed by learners, F (1, 28) = 7.3, $p < .05$; = 10.75, $p < .01$. Newman-Keuls pairwise comparisons indicated that the amount of verbal information provided by the learner in the school task with adult teachers was significantly greater than the amount of verbal information contributed by learners in all other conditions (< .01) (see Figure 6). Newman-Keuls comparisons also revealed that the amount of both item and category information contributed by learners was greater in the school task with adult teachers than in any other conditions ($p < .05$).

As shown in Figure 7, learners contributed more nonverbal information in the school than in the home task, F (1, 28) = 11.93, $p < .01$. Pairwise comparisons revealed that learners contributed significantly more nonverbal information in the school task with child teachers than they did in the home task with either adult ($p < .05$) or child teachers ($p < .01$), but no more than with adult teachers in the school task.

An ANOVA on learner placement revealed a main effect for task, and a significant teacher x task interaction, F (1, 28) = 9.57, $p < .01$; = 6.26, $p < .05$. Learners placed more items in the school than in the home task. However, as shown in Figure 8, learner

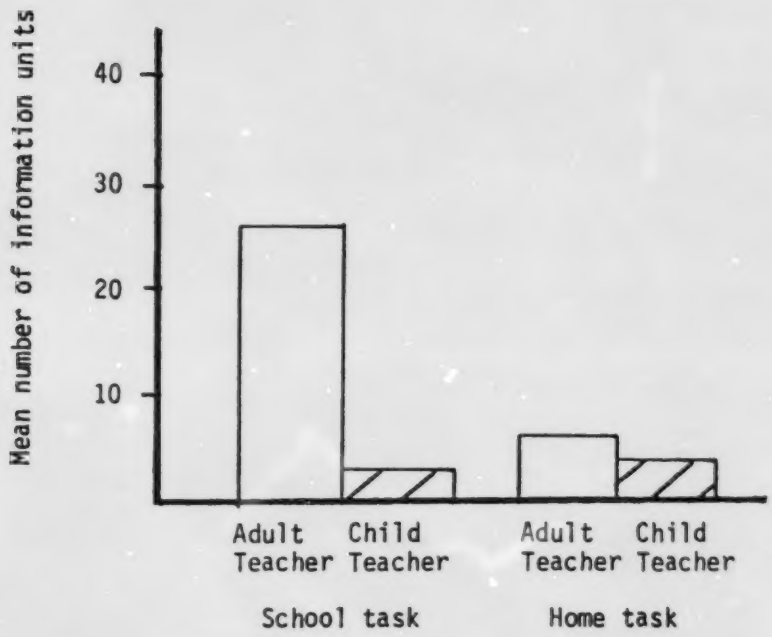

Figure 6. Amount of verbal information contributed by learner (teacher x task).

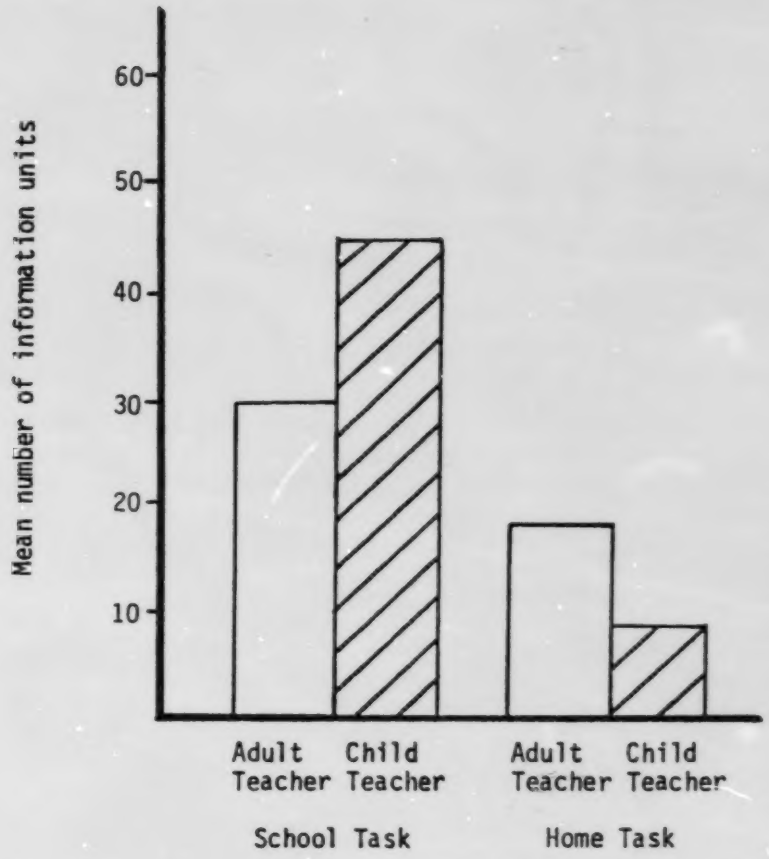

Figure 7. Amount of nonverbal information contributed by learner (teacher x task).

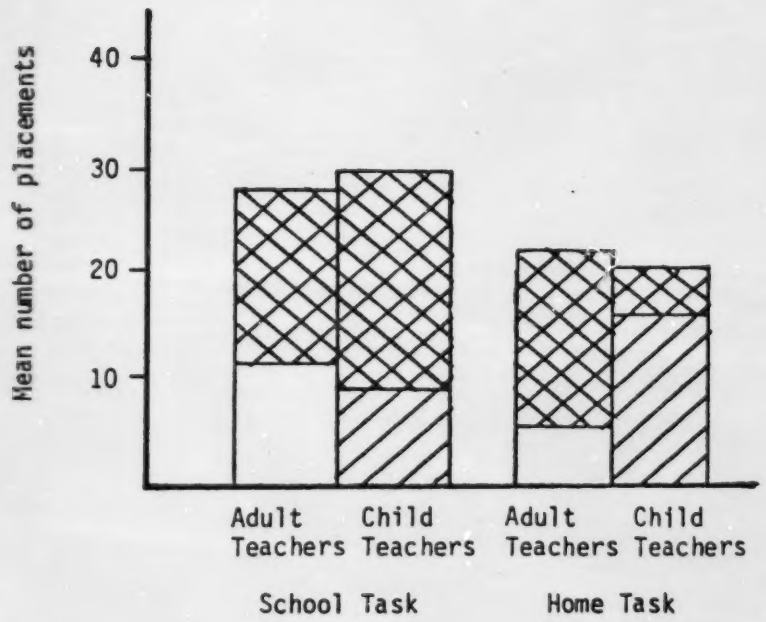

Figure 8. Distribution of placements by teachers and learners (teacher x task).

placement is actually very similar across all conditions, with the exception of child teachers in the home task. In all other conditions, both learners and teachers contributed substantially to item placement, with learners placing more items than teachers. In the home task, in contrast, child teachers placed 89% of the items, while learners placed only 11%. Newman-Keuls pairwise comparisons indicated that learners with child teachers in the home task placed significantly fewer items than did those with adult teachers in either the home or school task, or those with child teachers in the school task ($p < .05$; $< .01$; $< .01$).

DISCUSSION

The differences between adult and child teaching strategies mirrored those observed by Jordan (Note 5) and Mehan (1977) in classroom teaching interactions. Child teachers used more nonverbal than verbal instruction and provided information specific to items or individual instances more frequently than conceptual or category information. Adult teachers, in contrast, relied more on instruction mediated by language and provided more conceptual than item-specific information. We had expected that children would compensate for the reduced amount of information conveyed through verbal means by a corresponding increase in the amount of nonverbal information transmitted. In fact, adult and child teachers did not differ in the amount of nonverbal information conveyed. Thus, because adults transmitted more information verbally than did the child teachers, the learners taught by adults received more information than did those taught by children. Those learners taught by adults also performed better on tests for memory and generalization of task items than did learners taught by children.

Several plausible explanations for the less adequate teaching performance of the child teachers can be considered. First of all, the classification tasks used in the study were more easily learned if category information was provided. The failure of the child teachers to provide a sufficient amount of category information could feasibly be due to the child's lack of understanding of the category

structure of the tasks. However, interviews with the child teachers after the teaching session indicated that the child teachers could provide category names or descriptions for virtually all of the categories ($\bar{X}$ = 5.8). A second possible explanation would be that the child teachers did not understand the importance of teaching the groupings of items for future recall. Although Kreutzer and her colleagues (Kreutzer, Leonard, & Flavell, 1975) have shown that third grade children are aware of the effect grouping items has on their own memory, children of this age may not relate the understanding of their own memory processes to the memory capabilities of others. Finally, the nine-year-old teachers could have been aware of the usefulness of teaching the category structure of the tasks, but were unable to translate this knowledge into adequate instructions. The problem here would not seem to be merely one of communication abilities. Research on children's communication has demonstrated that children of this age are skilled at recognizing and producing listener-appropriate speech (Hoy, 1975; Peterson, Danner, & Flavell, 1972; Piaget, 1959; Robinson & Robinson, 1972; Whitehurst & Merkur, 1977).

The problems that the child teachers had in providing good instruction may be due to the numerous demands placed on the child by the teaching interaction. Cazden and her colleagues (Carrasco, et al., in press; Cazden, et al., 1979) have noted that teaching involves more than just the transmission of information; teaching also requires the management of interpersonal relations and roles. Our tasks required the child teachers to be concerned with task completion, the learners' future performance on a test, and information transmittal, in addition to the social dimensions of the interaction. Although the child

teachers may have possessed adequate knowledge of the category information, memory skills, and communication techniques, they may have found the integration of these skills with the task too demanding.

It is possible that the child teachers responded by focusing on a single aspect of the task, i.e., task completion, to the neglect of other components of the task. Support for this possibility can be found in observations of classroom episodes of peer teaching (Jordan, Note 5) and a comparison of mother and child teaching strategies on a sorting task (Steward & Steward, 1974). Steward and Steward found that adult teachers were able to provide interrelated information about task materials and the physical performance of the task in single instructions (e.g., "Put the yellow circle in this box") while the child teachers provided simpler instructions including either material or performance information. The authors hypothesized that the adult teachers were capable of conceptualizing the task in terms of both the cognitive activity of classification and the physical placement of items, while the child teachers centered on one aspect of the task. Although the authors reported no data on the learner's understanding of the completed task, the authors suggested that the simpler instructions provided by the child teachers may have been more appropriate for the preschool learner than the instructions provided by the adults. Our data suggested, however, that although the child teachers probably did focus on one aspect of the task, such focusing was detrimental to the learning of the younger child.

Researchers interested in children's development of self-regulation have emphasized the importance of instruction aimed at a level which does not require the child to attempt to do too much alone, yet

allows the child some degree of participation (Wood & Middleton, 1975; Wood, Wood, & Middleton, 1978). Learner participation in our teaching interactions was greater with adult than child teachers. Young teachers may be unskilled at perceiving the "region of sensitivity" for optimal instruction.

The children's reliance on nonverbal instruction with the particular tasks used in this study may have been another source of the difficulties the children experienced while teaching. Several authors have noted that the instructional technique of demonstration simply requires the learner to make sense of too much information (Olson, 1972; Wood, Wood, & Middleton, 1978). It is very likely that the predominantly nonverbal instruction used by the child teachers could not provide the information the learners required in order to discriminate correctly the dimensions along which the items were classified.

The two tasks used in this study elicited differences in instructional strategies which tend to support the distinction between informal and formal modes of education as discussed by Bruner, Scribner and Cole, and Vygotsky, among others. Both adult and child teachers provided more verbal information, particularly category information, in the school than in the home task. Contrary to expectations, however, more nonverbal information was also conveyed in the school than in the home task.

Child teachers showed a greater awareness of the teacher role in the school than in the home task. The children often used school-like language and teacher intonations (e.g., that's correct; that's right, next...next) and frequently seemed unwilling to give away too much information about the task, preferring to allow the learner to guess

his/her way to a correct answer. In the home task, in contrast, the child teachers often appeared very willing to place the items for the learner. This suggests that children teaching school tasks do not generalize from their experience teaching nonacademic tasks, but rather imitate the teaching they have observed in the school setting.

The fact that differences in instructional strategies can be elicited by two similarly structured laboratory tasks clearly indicates that different tasks can give rise to different styles of teaching. Researchers studying teaching strategies, whether in "real-world" or artificial contexts, should consider the impact the tasks may have on the strategies observed. Further research examining the instructional strategies used by children on tasks varying in social and cognitive demands is needed. Our findings suggest that peer teaching, at least on cognitive tasks, involves a number of demands which children of this age may find difficult to manage simultaneously. Studies investigating peer teaching on everyday, non-academic tasks, or laboratory studies of children's teaching strategies on social tasks may well indicate that children are effective teachers of other children on other tasks.

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